

STREAM HABITAT RESTORATION GUIDELINES

1 HEADING PLACEHOLDER – DO NOT DELETE

2 HEADING PLACEHOLDER – DO NOT DELETE

3 HEADING PLACEHOLDER – DO NOT DELETE

4 HEADING PLACEHOLDER – DO NOT DELETE

5 DESIGNING AND IMPLEMENTING STREAM HABITAT RESTORATION PROJECTS

Discuss how this should not be done until after assessment and selection of approach.

This is a first cut (20% draft) at developing an introductory section to introduce the techniques, and to provide information that is common to all or most techniques, but not otherwise in the appendices, or which may be in greater detail in the appendices. Because this was not developed by WDFW, it is expected that WDFW and other reviewers will take considerable liberties in helping to determine what the content of this introductory chapter should contain.

The first draft will be an outline (20%), the next effort will be 50%, all conducted within Task 2 – 50%.

5.1 *Introduction to Techniques*

5.1.1 *Organization of Techniques*

This subsection will discuss how techniques are organized. In scoping workshop, it was suggested to organize according to desired outcome. In our meeting at WDFW on January 30, it was decided to hold off on grouping techniques until a later date. This will be addressed again at 90%.

The collection of techniques presented herein is not a comprehensive list of all stream habitat restoration, creation, and enhancement techniques that have been or are commonly applied to promoting fish habitat. It does not include: May not include every possible watershed management technique to address point and non-point source pollution (e.g., street cleaning)

- Non process-based techniques. Many traditional structural techniques do not promote process. For example, lunker structures and simple log drops, while potentially providing some habitat value, do not necessarily promote natural channel processes. Similarly, simply constructing a pool or run does not in itself necessarily promote processes that create and maintain habitat. —not true, it includes lots of non-process based techniques.
- Techniques that have been used in the past that have not been successful, or which inhibit or impede

natural process. This includes any form of hardening of the channel or banks that will ultimately restrict the channel's ability to adjust to changing inputs.

- Techniques that may be appropriate but whose utility has not been demonstrated to date or is not known to the authors at this time.

Land use planning and establishment of protective regulations is extremely critical to restoration but is beyond the scope of this document.

5.2 Type of Information Included Within Each Technique (description, application, methods and design...)

5.2.5.3 Design of Techniques

The science of natural channel design is a relatively young and developing science. It is inexact, and requires understanding of many disciplines within the natural sciences and engineering. It is commonly the subject of debate among academics and practitioners from many disciplines and organizations.

Approaches to the design of Techniques for restoring, enhancing, and creating natural channels and fish habitat are numerous, and many are unproven. However, there is common acceptance from all involved as practitioners or those promoting the development of the science that design must be an interdisciplinary process and therefore must involve design teams composed-comprised of experts from different disciplines. These disciplines include, at a minimum:

- Fish biology
- Geology and geomorphology
- Hydrology and hydraulics
- Geotechnical, civil, and hydraulic engineering
- Plant ecology
- Aquatic ecology

No single approach to design habitat restoration technique is promoted or recommended in this document. But need to promote use of techniques that restore stream process and treat the cause of the problem, not the symptom. [This paragraph belongs in 5.1.]

The intent of the techniques presented is to restore natural processes which create and maintain stream habitat, and processes such as sediment transport, scour, deposition, channel migration, riparian development, nutrient cycling, floodplain flooding, etc. Some of the techniques may not necessarily be geared strictly toward restoring process, but are nonetheless included because there may be other utility in their application, particularly in situations where achieving equilibrium in true restoration of channel processes may be particularly difficult impossible given political, social and physical landuse constraints, such as those found in highly urbanized stream systems.

5.2.15.3.1 *Levels of Design*

Project dDesign typically occurs in a number of phases. Conceptual designs are commonly presented to identify and illustrate alternatives. Conceptual designs may include schematics of approaches, with a foundation (?) basic design considerations to address **alternative project** feasibility. A selected concept will **then** be carried **forward**~~urther~~ to identify all **necessary** design components **[define]** and to develop design criteria for these components (refer readers to discussion of design criteria somewhere). These criteria are developed to address each specific project objective and design component. Once design components are identified, design analyses are conducted and details developed for each. These are finally illustrated and detailed in plans and specifications, the necessary documentation from which implementation can be conducted.

5.35.4 *Considerations Common to Restoration Techniques*

5.3.15.4.1 *Construction Issues*

Construction issues are common, and are addressed in the Appendix. Construction sections of each technique will address any aspects that are unique to the technique.

5.3.25.4.2 *Permitting*

WDFW will add a section to Chapter 4 to cover permitting and provide resources for permitting. Techniques will address only specific permitting requirements

5.3.35.4.3 *Monitoring*

Monitoring issues are common, and are addressed in the Appendix. Monitoring sections of each technique will address any aspects that are unique to the technique.